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STUDIES IN THE GENERA OF THE *DIOSMEAE* (RUTACEAE): 6.

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Abstract

Acmadenia marlothii is transferred to the genus *Agathosma*. A new species of *Euchaetis* from the Piketberg is described. Two new species of *Acmadenia* from dry inland areas of the Cape Province, bordering on the Karoo, are described. A new species of *Diosma* from the mountains of the Little Karoo, formerly misidentified as *D. ramosissima*, is described. Four new species of *Diosma* from the coastal region between Walker Bay and Albertinia are described.

Uittreksel

STUDIES IN DIE GENERA VAN DIE *DIOSMEAE* (RUTACEAE): 6

Acmadenia marlothii word by *Agathosma* ingedeel. 'n Nuwe *Euchaetis* soort vanaf Piketberg word beskryf. Twee nuwe *Acmadenia* soorte uit die droë binneland aangrensend aan die Karoo word beskryf. Vier nuwe *Diosma* soorte van die kusstreek tussen Walkerbaai en Albertinia word beskryf.

Agathosma rudolphii Williams nom. nov. vice *Acmadenia marlothii* Dümmer in Ann. Bol. Herb. **3** (2): 86 (1921). Type: CAPE—3319 (Worcester): Matroosberg (-BC), 2 000 m, –11/– *Marloth 7948* (PRE, lectotype; BOL, fragment of type).

Specimens Examined

CAPE—3319 (Worcester): Matroosberg (-BC), 2 000 m (6 400 ft.), –/11– *Marloth* 7948 (PRE, BOL); Witteberg amongst rocks (-CA), 5 400 ft., 9/2/1943 *Esterhuysen 8678* (BOL); Du Toits Peak, n.w. slopes above gully (-CC), 6 000–6 500 ft., 26/1/1943 *Esterhuysen 8572* (BOL, NBG), 17/12/1972 *Myburgh 7* (STE); Wemmershoek Peak, gully on west side 5 000–5 793 ft., 31/12/1944 *Esterhuysen 11235* (BOL, GRA, K, NBG, SAM), 15/11/1968 *Jackson s.n.* (NBG), –/12/1944 *Stokoe s.n.* (SAM), –/12/1944 *Lewis s.n.* (SAM).

A close examination of material collected by Esterhuysen (No. 32094) and Myburgh (No. 7) has revealed several characters which exclude this plant from the genus *Acmadenia* and indicate that it should rather be placed in the genus *Agathosma* sensu Pillans: (1) the *flowers* are borne on slender terminal or axial branchlets; (2) *staminodes* 2,7 mm long, 0,7 mm broad, linear (not terete),

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glabrous, flat with an obtuse swollen apical gland; (3) *filaments* becoming 5,5 mm long, very sparsely villous towards the middle (not short and glabrous); (4) *pollen* 25 μ long, 17 μ diam. (much smaller than any in *Acmadenia*); (5) *disc* flat at the base of the ovary (does not surround the ovary); (6) *stigma* simple (not capitate); (7) *style* quite thick, at first completely deflexed, then more or less erect, 4 mm long, villous about the middle (not short and glabrous); (8) *ovary* and *fruit* 5-carpellate with short shovel-shaped apical processes (quite unlike any in *Acmadenia*).

This plant might have fitted very well into the genus *Barosma* but, as this genus has been sunk into *Agathosma*, it is now proposed that it be placed in *Agathosma* sensu Pillans. In doing so it is not possible to transfer the epithet *marlothii* to *Agathosma* without creating a homonym, consequently one of the christian names of Dr. H. W. R. Marloth, who discovered this plant, has been proposed as the new specific epithet.

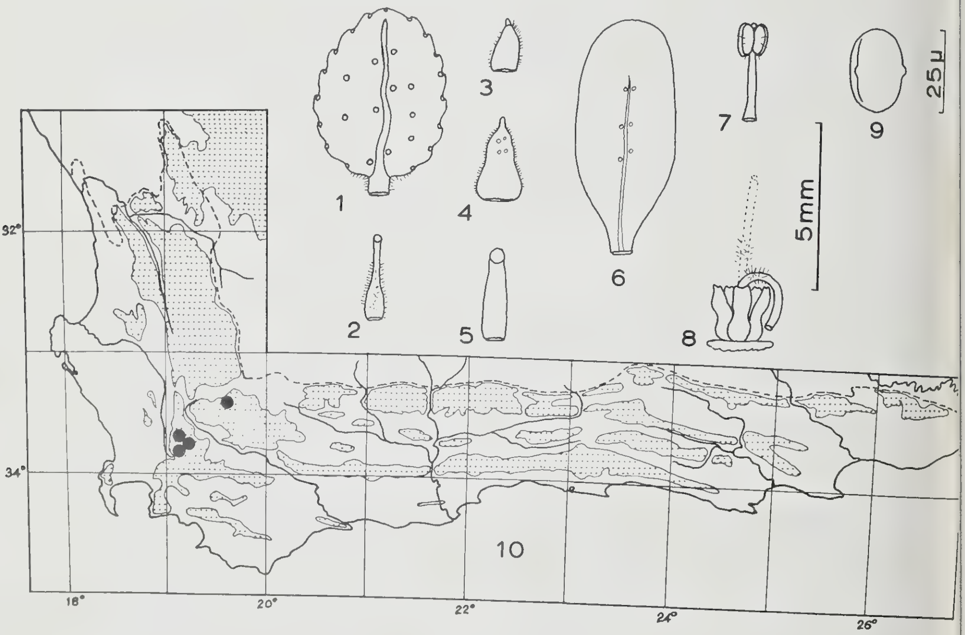

FIG. 1.

Agathosma rudolphii: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, staminode. 6, petal. 7, anther. 8, gynoecium. 9, pollen. 10, distribution. (Broken line shows northern limit of Cape geological system. Mountainous areas shown dotted.)

Euchaetis tricarpellata Williams sp. nov. propria propter fructum tricarpellatum.

Frutex ad 40 cm, ad basim monocaulis. *Rami* graciles, laevigati, erectiusculi. *Ramuli* erecti, graciles, glabri, foliis vestitis. *Folia* 5,5–7 mm longa, 1 mm lata, anguste lanceolata, acuta, mucronata, glabra, sub-glauca, eciliata, erecta, adpressa, alterna, brevissime petiolata. *Flores* c. 5 mm diam., terminales, 2–3 nati, albi. *Bractea* folio similis. *Bracteolae* duae, 3,3 mm longae, 1,2 mm latae, lanceolatae, acutae, mucronatae, glabrae, sub-glaucae, eciliatae, marginibus ad basim hyalinis. *Sepala* quinque, 4 mm longa, 2 mm lata, late lanceolata, acuta, glabra, glauca, eciliata, marginibus ad basim late hyalinis. *Petala* quinque, 6 mm longa, unguiculata, alba; *limbus* 3,5 mm longa, 3,5 mm lata, orbicularis, glaber, minute apiculatus; *unguis* 2,5 mm longus, 1,4 mm latus, transverse barbatus, ciliatus, ad basim translucidus. *Staminodia* quinque, 0,05 mm diam., vestigialia. *Filamenta* quinque, post anthesin, 1,5 mm longa, acicularia, glabra. *Antherae* quinque, ante anthesin 1,2 mm longae, 0,8 mm latae, vinosae, apicibus minute glandulosis. *Pollen* 45 μ longum, 23 μ diam., ellipsoideum. *Discus* ovarium ex parte includens, nectarifer. *Stigma* 0,5 mm diam., capitatum, globosum. *Stylus* post anthesin 1 mm longus, erectus, glaber, persistens. *Ovarium* 3-carpellatum, 0,7 mm diam., glabrum. *Fructus* 3-carpellatus, 9 mm longus, 4,5 mm diam., laevigatus, glaucus, in medio vinosus, *cornibus* 2 mm longis, erectis, emarginatis. *Semen* 4,1 mm longum, 2 mm latum, atrum, impolitum; *arilus* 1,5 mm longus, albus, acutus.

Type: CAPE—3218 (Clanwilliam): south from the summit of Versvelds Pass, Piquetberg (-DC), 640 m, 18/9/1972 *Williams 1690* (NBG, holotype).

This species was collected for the first time by Schlechter in 1894 and then again by Stokoe in 1941. After that it appears to have escaped notice until the author rediscovered it in 1972. Being a very inconspicuous plant, this is hardly to be wondered at and does not necessarily mean that it is rare on the Piquetberg when it occurs.

Shrubs up to 40 cm tall, inconspicuous, slender, diffuse, arising from a single stem at ground level. *Branches* slender, smooth, fairly erect. *Branchlets* erect, slender, glabrous, well clothed with leaves. *Leaves* 5,7–7 mm long, 1 mm broad, narrowly lanceolate, acute, mucronate, glabrous, sub-glaucous, indistinctly gland-dotted, eciliate, erect, adpressed, alternate, with a very short petiole. *Flowers* about 5 mm diam., terminal, white, 2–3 nate. *Bract* leaf-like. *Bracteoles* two, 3,3 mm long, 1,2 mm broad, lanceolate, acute, mucronate, glabrous, sub-glaucous, eciliate, margins below translucent. *Sepals* five, 4 mm long, 2 mm broad, broadly lanceolate, acute, glabrous, glaucous, eciliate, margins broadly translucent below. *Petals* five, 6 mm long, white, clawed; *limb* 3,5 mm long, 3,5 mm broad, orbicular, glabrous, minutely apiculate; *claw* 2,5 mm long, 1,4

mm broad, transversely bearded, ciliate, translucent towards the base. *Staminodes* five, 0,05 mm diam., vestigial. *Filaments* five, acicular, glabrous, after anthesis 1,5 mm long. *Anthers* five, before anthesis 1,2 mm long, 0,8 mm broad, wine coloured, with a minute rounded apical gland. *Pollen* ellipsoid, 45 μ long, 23 μ diam. *Disc* closes somewhat over the ovary, exudes nectar. *Stigma* 0,5 mm diam., capitate, globose, apex faintly 3-furrowed. *Style* becoming 1 mm long after anthesis, erect, glabrous, persisting. *Ovary* 3-carpellate, 0,7 mm diam., glabrous, the apices of the segments truncate. *Fruit* 3-carpellate, 9 mm long, 4,5 mm diam., smooth, glaucous, somewhat purplish about the middle; *horns* 2 mm long, erect, emarginate. *Seed* 4,1 mm long, 2 mm broad, black, not shining, with a pointed white aril 1,5 mm long.

SPECIMENS EXAMINED

CAPE—3218 (Clanwilliam): south from the summit of Versvelds Pass, Piquetberg (-DC), 640 m, 18/9/1972 Williams 1690 (NBG, holotype) 7/11/1974 *Williams 1917* (BOL); In planitis summum montis Piquetberg, 1 600 ft., 9/9/1894 *Schlechter 5244* (BOL, GRA); Kapteinskloof, Piquetberg, 25/9/1941 *Stokoe 8171* (BOL).

DISTRIBUTION, BIOLOGY AND VARIATION

Euchaetis tricarpellata occurs only on the mountains above Piquetberg in the South Western Cape at altitudes from 490 to 640 metres above sea level. It grows in hard quartzitic soil amongst rocks of the Table Mountain Series. Material that was both flowering and fruiting has been gathered in September and again in November. The presence of nectar in the flowers indicates that this plant is most likely to be pollinated by insects. The leaves, when crushed, have a smell of pine or cypress. Regeneration is by seed which is ejected in the usual way by a catapult mechanism. Isolated, as it is, on the Piquetberg, where this plant is the only representative of the genus *Euchaetis*, it is most unlikely that any variation or hybridisation will ever be found.

DISCUSSION

In the following respects this plant falls typically into the genus *Euchaetis*: (1) *petals* clawed and transversely bearded in the vicinity of the throat. These beards and the cilia of adjacent petals from a cage within which are found all the reproductive parts; (2) *staminodes* vestigial; (3) *anther* with a minute apical gland; (4) *disc* exceeds the ovary; (5) *stigma* capitate; (6) *style* short; (7) *filaments* and *style* glabrous. However, in one respect, the possession of a 3-carpellate ovary, this plant is unique in the genus. Northwards, in the Clanwilliam Division one finds *Euchaetis dubia* Sond. and to the south in the Cape and Malmesbury Divisions one finds *Euchaetis dubia* var. *dregeana* Sond. These species are plainly very closely related to *E. tricarpellata* but, amongst other things, they both have 4-carpellate ovaries. Sonder (1860) in describing *E. dubia* was somewhat hesitant in placing it in *Euchaetis* and Bentham and Hooker (1862–67) thought it should be transferred to *Macrostylis*. However, a close examination of *E. dubia* shows that it should remain in *Euchaetis* and that, quite possibly, it demonstrates an example of evolutionary reduction in the genus of which *E. tricarpellata* is but a further link.

Euchaetis tricarpellata is recognised as a distinct species because of its three-chambered ovary. It differs from *E. dubia* var. *dregeana* which has leaves and calyx lobes crisped ciliate and a 4-chambered ovary.

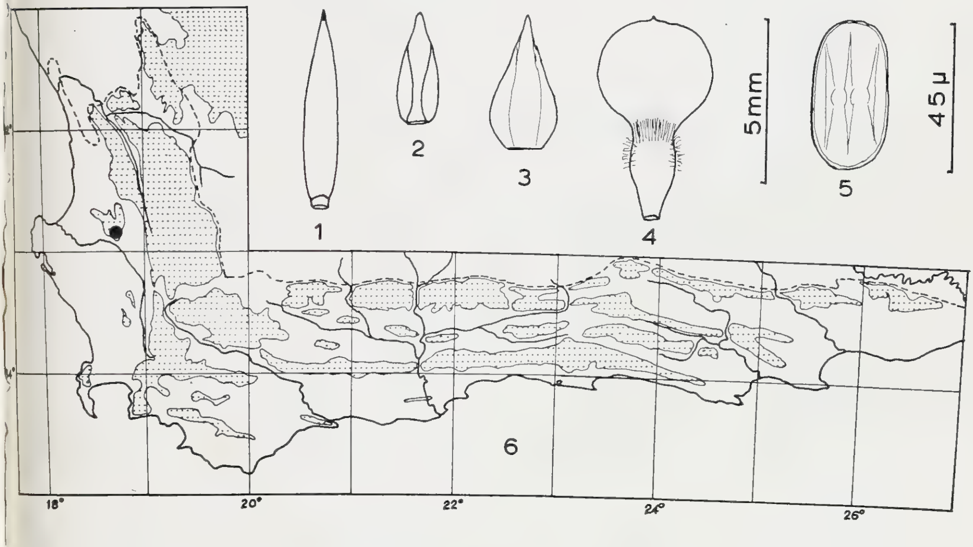

FIG. 2.

Euchaetis tricarpellata: 1, leaf. 2, bracteole. 3, calyx lobe. 4, petal. 5, pollen. 6, distribution.

Acmadenia fruticosa Williams sp. nov. propria propter fruticem fruticosum, foliis ellipticis parvis oppositis, flore 1 cm diam.

Frutex fruticosus, c. 80 cm, ad basim monocaulis. *Rami* brevi, glabri, erectiusculi, saepe dichotomi. *Ramuli* brevi, graciles, recti, puberuli, rubescenti. *Folia* 3–5 mm longa, 1,5–2 mm lata, elliptica, obtusa, breve petiolata, sparse puberula, glanduloso-punctata, costata, erecto-patens, opposita, decussata.

Inflorescentia terminalia, solitaria, 1 cm diam., alba vel sub-rosea. *Bracteae* duae, oppositae, 3,3 mm longae, 1,5 mm latae, unus similis foliis, alter marginibus ad basim hyalinis et ciliolatis. *Bracteolae* duae, 3 mm longae, 1,4 mm latae, oblangae, sub-acutae, ciliatae, extus sparsim puberulae, intus pubescentes, marginibus late hyalinis. *Sepala* quinque, 3 mm longa, 1,5–1,7 mm lata, oblonga, ciliata, apicibus acutis elevatis vinosis, marginibus late hyalinis, extus fere glabra, minute glanduloso-punctata, intus in medio pubescentia. *Petala* quinque, 7 mm longa, 2,8 mm lata, unguiculata, sub-roseus; *limbus* obovatus, obtusus, apiculatus, minute ciliolatus, in medio glanduloso-punctatus; *unguis* ad faucem inflexus sparsim puberulus, sparsim ciliolatus. *Staminodia* quinque, 1,2 mm longa, glabra, acicularis, apicibus glandulis coronatis. *Filamenta* quinque, post anthesin 2,3 mm longa, acicularia, glabra. *Antherae* quinque, ante anthesin 1,6 mm longae, 0,7 mm latae, flavidae, apicibus acute glandulosis. *Pollen* 39 μ longum, 26 μ diam., oblongum. *Discus* ovarium excedens, viridus, angustus, nectarifer. *Stigma* 0,7 mm latum, globosum, viridum, capitatum. *Stylus* post anthesim 1,3 mm longus, erectus, glaber, persistens. *Ovarium* 5-carpellatum, 0,75 mm diam., glabrum. *Fructus* 5-carpellatus, 7,5 mm longus, 4 mm diam., ad basim sepalis bracteisque obvallatus; cornibus erectis brevis. *Semen* 4,5 mm longum, 1,5 mm latum, piceum, nitens.

Type: CAPE—3321 (Ladismith): on the south side of road at the summit of Bosluiskloof Pass (-AD), 1 140 m (3 750 ft), Laingsburg Division, 12/7/1974 *Williams 1908* (NBG, holotype; C, GRA, K, M, MO, PRE, S, STE, isotypes).

This plant had been collected in the past by Esterhuysen, Wall and Halfstrom & Acocks and had remained undescribed until its rather unique appearance excited the author's curiosity. Attempts to locate it in the vicinity of Wittepoort were unsuccessful but, after seeing the collection by Halfstrom and Acocks amongst some material recently sent out for examination from Stockholm, the author was fortunate to be able to find a large and thriving population in the vicinity of the Bosluiskloof Pass. The description of this new species has been based upon this fresh material.

Shrubs about 80 cm tall, forming a dense bush with many branches arising from a single stem at ground level. *Branches* short, glabrous, fairly erect, often dichotomous. *Branchlets* short, slender, erect, puberulous, reddened. *Leaves* 3–5 mm long, 1,5–2 mm broad, elliptic, obtuse, margins thick, narrowed below to a short petiole, sparsely puberulous on all sides, with small gland-dots scattered mostly towards the prominent midrib, spreading-erect, opposite, decussate. *Inflorescence* terminal, solitary, 1 cm diam., white or pale pink. *Bracts* two, opposite, 3,3 mm long, 1,5 mm broad, one leaf-like, the other obovate, obtuse with the margins below translucent and ciliolate. *Bracteoles* two, 3 mm long, 1,4 mm broad, oblong, apex elevated, sub-acute and thick, midrib prominent, margins ciliate and broadly translucent below, outer surface

sparsely puberulous, inner surface pubescent towards the middle. *Calyx lobes* five, 3 mm long, 1,5–1,7 mm broad, oblong, apex acute elevated wine-coloured, margins broadly translucent and ciliate, pubescent in the middle on the inner surface, minutely gland-dotted along the midrib and almost glabrous on the outer surface. *Petals* five, 7 mm long, 2,8 mm broad, clawed, pale pink or white; *limb* obovate, obtuse, apiculate, minutely ciliolate, gland-dotted towards the middle; *claw* bent inwards and sparsely puberulous at the throat, ciliolate. *Staminodes* five, 1,2 mm long, acicular, glabrous, apex glandular. *Filaments* five, becoming 2,3 mm long, erect, glabrous, acicular. *Anthers* five, before anthesis 1,6 mm long, 0,7 mm broad, yellow, with a pointed gland 0,2 mm long at the apex. *Pollen* 39 μ long, 26 μ diam., oblong. *Disc* exceeds the ovary, narrow, green, exudes nectar, without lobes. *Stigma* 0,7 mm broad, globose, capitate, green, sticky. *Style* becoming 1,3 mm long, erect, glabrous, persisting. *Ovary* 5-carpellate, 0,75 mm diam., glabrous, each carpel retuse with a submerged gland at the apex. *Fruit* 5-carpellate, 7,5 mm long, 4 mm diam., imbricated below by the persistent calyx lobes and bracts; *carpels* green, margins fringed with small hairs, with short erect purplish horns bifid at the apex with a gland in the centre. *Seed* 4,5 mm long, 1,5 mm broad, black, shining.

SPECIMENS EXAMINED

CAPE—3320 (Montagu): Witte Poort on sandstone hill, Ladismith/Laingsburg (-BD), –/5/1940 *Esterhuysen 1810* (BOL); Touwsberg, ridge on south slope (-DB), 2 000–3 000 ft., 1/6/1956 *Esterhuysen 25929* (BOL).

—— 3321 (Ladismith): Bosluiskloof Pass near Prince Albert (-AD), 14/11/1938 *Halfstrom* & *Acocks 787* (S); south side of the road at the summit of Bosluiskloof Pass, 1 140 m (3 750 ft.), 12/7/1974 *Williams 1908* (NBG, C, GRA, K, M, MO, PRE, S, STE), 14/11/1938 *Wall 55* (BOL). Note: *Wall 55* was previously cited in error under *Acmadenia sheilae* in Williams Studies No. 4, in Jl S. Afr. Bot. 40 (4): 281 (1974).

DISTRIBUTION, BIOLOGY AND VARIATION

Although *Acmadenia fruticosa* has only been collected in three localities it does occur so abundantly in the one examined by the author, at the summit of the Bosluiskloof Pass, that one feels that it must really be quite common. It appears to grow at altitudes of 600–1 200 m (2 000–4 000 ft.) above sea level on dry shallow quartzitic soil amongst brown rocks of the Table Mountain series. A section from the stem of a plant 80 cm tall, taken just above ground level, showed about 50 annual rings showing that this area had not been burnt for many years. Little is known about the flowering period but it probably extends over many months. The type collection made in July had flowers and fruits in all stages of development. The fact that the disc exudes nectar and that the style, bearing the stigma, lengthens only after the anthers have discharged their pollen indicates that this plant is most probably pollinated by insects. Regeneration is only from seed which is ejected as soon as ripe by the usual catapult mechanism. The leaves when crushed have a rather weak resinous smell.

Variation in *Acmadenia fruticosa* has been observed. Specimens from Witte Poort about 60 km west of Bosluiskloof Pass are found to have leaves with gland-dots on the margins as well as towards the midrib, petals somewhat smaller, 4,6 mm long, 1,5 mm broad and staminodes shorter, 0,8 mm long.

DISCUSSION

This plant appears to be a typical *Acmadenia* mainly because: (1) the *petals* are clawed and bent inwards at the throat, and (2) *staminodes* are present with a pointed gland at the apex. Other factors which exclude other genera of the *Diosmeae* are: (3) *anther* with a small pointed gland; (4) *disc* exceeds the ovary; (5) *stigma* capitate; (6) *style* short, erect; (7) *filament* and *style* glabrous; (8) *ovary* 5-carpellate.

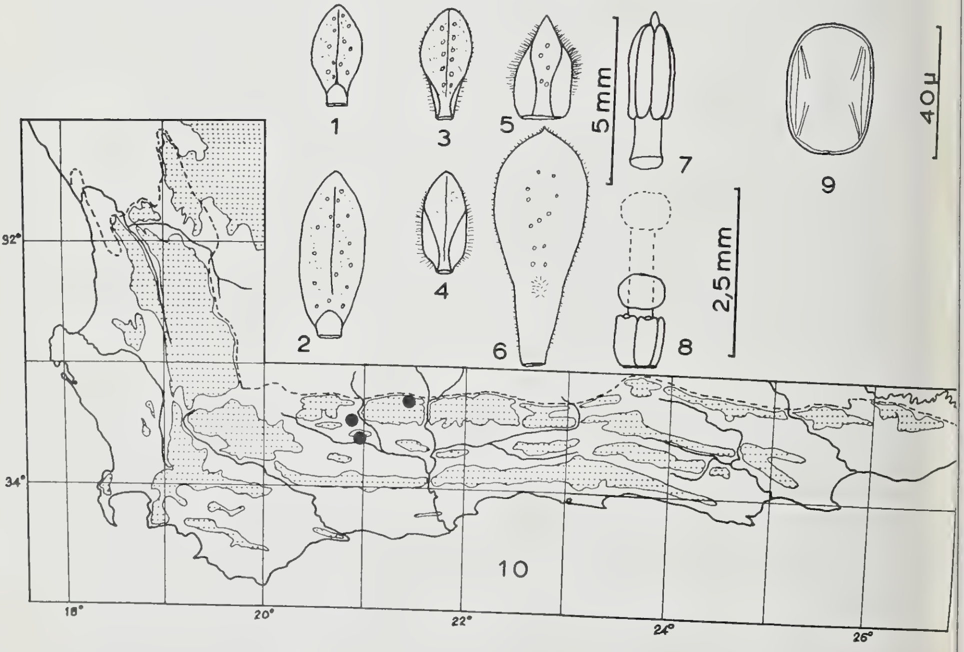

FIG. 3.

Acmadenia fruticosa: 1, small leaf. 2, large leaf. 3, bract. 4, bracteole. 5, calyx lobe. 6, petal. 7, anther. 8, gynoecium. 9, pollen. 10, distribution.

Acmadenia fruticosa is recognised as distinct because of having small elliptic leaves and smallish pale pink flowers 1 cm diam. Several other species of *Acmadenia*, namely *A. laxa* Williams, *A. macropetala* (Glover) Compton, *A. niveni* Sonder, *A. obtusata* (Thunb.) Bartl. & Wendl., *A. sheilae* Williams and *A. tetragona* (L.f.) Bartl. & Wendl. have a similar arrangement of opposite leaves and obvallate bracts at the base of the fruit. They are all however easily recognised as distinct from *A. fruticosa* here described. The name is an allusion to the very dense bushy habit of the plant.

Acmadenia tetracarpellata Williams sp. nov. propria propter fructum 4-carpellatum.

Frutex fruticosus, 50 cm altus, 1 m diam., ad basim monocaulis. *Rami* numerosi, sub-dichotomi, erectiusculi, glabri, intertexti. *Ramuli* numerosi, erectiusculi, graciles, sparsim puberuli, aliquot glanduloso-punctati. *Folia* 3 mm longa, 1,5–2,5 mm lata, elliptica vel orbicularia, obtusa, crassa, apice immerso-glanduloso, marginibus crassis glanduloso-punctatis, costa disperso-glanduloso-punctata, tota sparsim puberula, sub-glauca, sessilia, opposita, patentia, decussata. *Inflorescentia* 2-nata, terminalia, inconspicua. *Bracteae* folia similis, duae, oppositae, 1,5 mm longae, 1,3 mm latae, orbiculares, puberulae, crassae, sessiles, patentes, costa glanduloso-punctata, apice tumido-immerso-glanduloso. *Bracteolae* duae, 0,7 mm longae, 0,5 mm latae, orbiculares, crassae, ciliolatae, totae sparsim puberulae, apice immerso-glanduloso. *Sepala* quinque, 1,2 mm longa, 0,7–0,8 mm lata, oblonga, obtusa, minute ciliolata, minute puberula, sparsim glanduloso-punctata. *Petala* quinque, 2 mm longa, 0,9 mm lata, lanceolata, obtusa, intus ad basim extusque sparsim pubescentia, sessilia, patentia, marginibus revolutis serrulatis. *Staminodia* quinque, 0,3–0,5 mm longa, ad apices glandulosa. *Filamenta* quinque, post anthesin 1,2 mm longa, acicularia, glabra. *Antherae* quinque, ante anthesin 0,7 mm longae, 0,5 mm latae, roseo-flavae, apicibus sessili-glandulosis. *Pollen* 40 μ longum, 20 μ diam., oblongum· *Discus* viridus, sub-sinuatus, ovarium aequans, nectarifer. *Stigma* 0,2 mm diam., capitellatum, globosum. *Stylus* primum deflexus deinde erectus, 0,8 mm longus, glaber, teres. *Ovarium* 4-carpellatum, 0,7 mm diam., glabrum. *Fructus* pleurumque 4-carpellatus, 5 mm longus, 4 mm diam., rubescens, glanduloso-punctatus, sparsim puberulus, cornibus 1,5 mm longis erecto-patentibus. *Semen* 3,2 mm longum, 1,5 mm latum, piceum, nitens.

Type: CAPE—3219 (Wupperthal): in sandy soil below small cliffs, Groenfontein, Swartruggens, Ceres Division (-DC), 1 220 m (4 000 ft.), 20/11/1974 *Williams 1928* (NBG, holotype; BOL, K, M, MO, PRE, S, STE, isotypes).

Acmadenia tetracarpellata was discovered by Miss Elsie Esterhuysen of the Bolus Herbarium in 1961. No further collections were made until 1974 when the author, following Miss Esterhuysen's directions, was able to make the collection on which this description is based.

Shrubs 0,5 m tall, spreading 1 m diam., dense, light green in colour, the lower branches becoming buried in sand, single stemmed at base. *Branches* numerous, stout at base, sub-dichotomous, somewhat spreading, very much interwoven, glabrous with a greyish brown fairly rough bark. *Branchlets* very numerous, slender, fairly erect, sparsely puberulous, with a few gland-dots. *Leaves* 3 mm long, 1,5–2,5 mm broad, elliptic or orbicular, obtuse, thick, apex with a blunt immersed gland, margins thick and gland-dotted, midrib with scattered gland-dots, sparsely puberulous on all sides, sub-glaucous, sessile, opposite, spreading, decussate, often widely spaced on the uppermost branchlets. *Inflorescence* 2-nate, terminal, white, inconspicuous. *Bracts* leaf-like in opposite pairs, 1,5 mm long, 1,3 mm broad, orbicular, puberulous, thick, sessile, spreading, apex curiously swollen with a submerged gland, midrib gland-dotted. *Bracteoles* two, 0,7 mm long, 0,5 mm broad, orbicular, thick, ciliolate, sparsely puberulous on both sides with a single gland-dot at the apex. *Calyx lobes* five, 1,2 mm long, 0,7–0,8 mm broad, oblong, obtuse, minutely ciliolate, minutely puberulous, with one or two small gland-dots on the midrib and at the apex. *Petals* five, 2 mm long, 0,9 mm broad, lanceolate, obtuse, sessile, spreading, white, very sparsely pubescent on the abaxial surface and on the inner surface towards the base, margins serrulate and revolute. *Staminodes* five, 0,3–0,5 mm long, apex glandular. *Filaments* five, glabrous, acicular, becoming 1,2 mm long. *Anthers* five, before anthesis 0,7 mm long, 0,5 mm broad, yellow tinged with pink, with a minute sessile apical gland. *Pollen* 40 μ long, 20 μ diam., oblong. *Disc* green, sub-sinuate, equals or exceeds the ovary, exudes nectar. *Stigma* 0,2 mm diam., capitellate, globose. *Style* glabrous, terete, at first deflexed becoming 0,8 mm long. *Ovary* 4-carpellate, 0,7 mm diam., glabrous. *Fruit* normally 4-carpellate, 5 mm long, 4 mm diam., reddened, gland-dotted, very sparsely puberulous, with *horns* 1,5 mm long, puberulous, with an immersed gland at the apex, spreading at 45°, petals and style persisting. *Seed* 3,2 mm long, 1,5 mm broad, black, shining.

SPECIMENS EXAMINED

CAPE—3219 (Wupperthal): in sandy soil below small cliffs, Groenfontein, Swartruggens, Ceres Division (-DC), 1 220 m (4 000 ft.), 20/11/1974 *Williams 1928* (NBG, BOL, K, M, MO, PRE, S, STE); in sand on slopes of valley below cliffs, Stompiesfontein, Swartruggens, Ceres Division, 3 500 ft., 18/11/1961 *Esterhuysen 29330* (BOL).

DISTRIBUTION, BIOLOGY AND VARIATION

Acmadenia tetracarpellata appears to be a fairly rare plant having only been collected on the farm Groenfontein lying in the Swartruggens. This is a dry elevated plateau about 4 000 feet above sea level consisting of quartzitic sandstone rocks of the Witteberg series interspersed with sandy plains, with rain falling mainly in the winter months.

The minute white flowers, wide open exposing the nectariferous disc, are most probably insect pollinated. The seeds when ripe are ejected by the usual catapult mechanism and regeneration is most probably possible only from seed. A section of the stem of one plant at ground level, 2 cm diam., showed at least 30 annual rings, showing that fires seldom occur. No seedlings were seen. It is therefore presumed that regeneration from seed may take place only after fire has cleared the ground. The leaves when crushed are aromatic with a faint scent of mint or lemon.

Branchlets, leaves, bracts and fruits on the plant collected by Esterhuysen are glabrous instead of minutely puberulous. This sort of variation has been seen to occur in other species in the *Diosmeae*. Of 50 fruits examined 2 were found to be 5-carpellate and 1 was found to be 3-carpellate. They were all from the same population. Often in the *Diosmeae* one finds that one or two carpels are not fertilised and so do not develop. This condition is easily observed as the aborted segment is quite visible. This is quite a different condition from the variation mentioned above which is due to the genic make-up inherent in the plant and in this case appears to represent reduction taking place from a 5-carpellate ancestral population. The extremely arid conditions under which these plants live may be the reason for all other forms of reduction observable in this species when compared with *Acmadenia fruticosa* and *Acmadenia sheilae*. In this series of fairly similar plants all parts show a stepped reduction in size enabling them to be described as distinct species.

Discussion

Although the flower of this plant with its wide open petals exposing the disc looks at first rather like a *Diosma*, the presence of staminodes attached at the outer base of the disc adjacent to the petals, the shape of the disc itself, closely surrounding the ovary not open and crenulate, and the obvious resemblance of the whole plant to *Acmadenia fruticosa* leads one to place it in the genus *Acmadenia*. *A. matroosbergensis* is another plant in this genus which agrees with *A. tetracarpellata* in many ways, including the size and positioning of the staminodes. Other factors which exclude this plant from other genera of the *Diosmeae* are: (1) *petals* without any transverse beard; (2) *staminodes* present; (3) *anther* with a small apical gland; (4) *stigma* capitellate; (5) *style* short; (6) *filament* and *style* glabrous.

Acmadenia tetracarpellata is recognised as distinct on account of its having extremely small open flowers and being the only plant in the genus with a 4-carpellate ovary, as the name signifies.

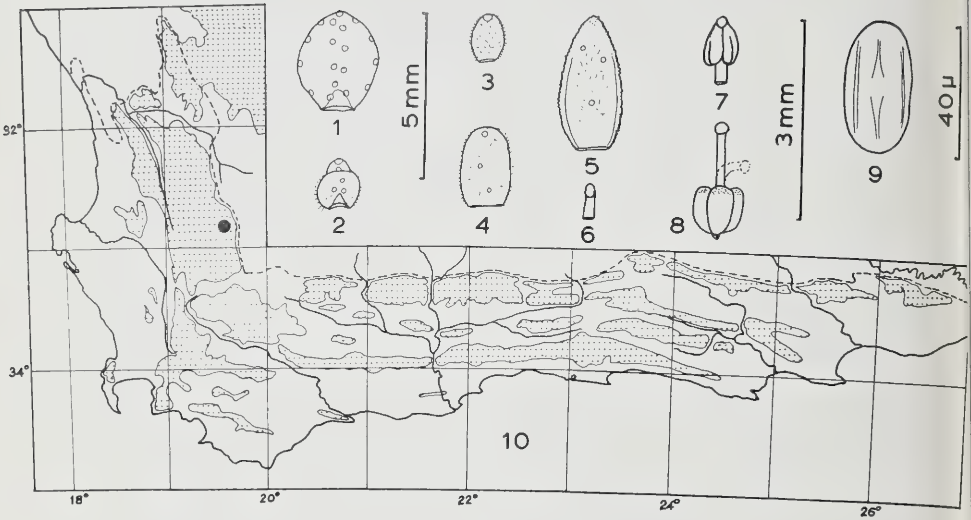

FIG. 4.

Acmadenia tetracarpellata: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, staminode. 7, anther. 8, gynoecium. 9, pollen. 10, distribution.

Diosma prama Williams sp. nov. propria propter ramulos paene glabros, folia glanduloso-pustulata praecipue versus costam, sepala glanduloso-pustulata sine callo apicali, petala glabra, stylum erectum, staminodia 0,2 mm longa.

Frutex ad 1,5 m, erectus, ad basim monocaulis. *Rami* erecti, glabri, dichotomi. *Cortex* laevis. *Ramuli* brevissimi, erecti, paene glabri. *Folia* 3–4,5 mm longa, 1,2–1,4 mm lata, oblonga, obtusa, glabra, eciliata, glanduloso-pustulata praecipue versus costam, erecta, adpressa, sessilia, alterna. *Inflorescentia* terminalia, 1-vel 2-nata, sessilia, 5 mm diam., eburnea. *Bractea* 1,1 mm longa, 0,8 mm lata, deltoidea, crassa, obtusa, glabra, glanduloso-pustulata, adpressa. *Bracteolae* duae, 1 mm longae, 0,7 mm latae, oblongae, obtusae, crassae, glabrae, glanduloso-pustulata, ad basim sparsim ciliolatae. *Sepala* quinque, 1,2 mm longa, 1,2 mm lata, ovata vel sub-orbiculares, apicibus incrassatis, ciliolata, extus glabra, glanduloso-pustulata, intus pubescentia. *Petala* quinque, 2,2 mm longa, 1,5 mm lata, oblonga, sessilia, glabra, patens, eburnea. *Staminodia* quinque, 0,2 mm longa, 0,1 mm diam. *Filamenta* quinque, post anthesin 1 mm longa, glabra. *Antherae* quinque, ante anthesin 0,8 mm longae, 0,7 mm latae, luteae,

apicibus minute glandulosis. *Pollen* c. 43 μ longum, 25 μ diam., oblongum. *Discus* 5-sinuato-crenulatus, patens, viridus, nectarifer. *Stigma* 0,3 mm diam., capitellatum. *Stylus* 0,8 mm longus, glaber, erectus. *Ovarium* 5-carpellatum, 0,9 mm diam., glabrum. *Fructus* 5-carpellatus, 7 mm longus, 6 mm diam., cornibus brevibus patens. *Semen* c. 6,3 mm longum, 2,5 mm latum, piceum, nitens.

Type: CAPE—3321 (Ladismith): north side of Rooiberg Pass (-CC), 570 m (1 850 ft.), 12/7/1974 *Williams 1905* (NBG, holotype; BOL, C, K, M, MO, PRE, S, STE, isotypes).

Diosma prama from the Little Karoo, has been collected many times in the past and has always been mis-identified as *Diosma ramosissima* Bartl. & Wendl. a species to which it has a superficial resemblance. It was only fairly recently with the publication in *Taxon* of an article by Gerhard Wagenitz (1972) on the Wendland herbarium, now in Göttingen, that it became possible to actually inspect the type material of *Diosma ramosissima* Bartl. & Wendl. and to compare it with specimens recently collected by the author from near Clanwilliam. As a result of this it became clear that the plant here described differed in several respects and it is now accordingly described as a new species. *D. prama* was apparently collected for the first time by Harry Bolus in 1904 between Garcias Pass and Muiskraal.

Shrubs up to 1,5 m tall, rigidly erect, fairly diffuse, arising from a single stem with a maximum diameter of about 3 cm at the base, standing above the general level of the vegetation. *Branches* erect, glabrous, dichotomous, with a fairly smooth bark. *Branchlets* on mature plants very short, erect, virtually glabrous, well clothed with leaves but soon becoming leafless. *Leaves* 3–4,5 mm long, 1,2–1,4 mm broad, oblong, obtuse, eciliate, glabrous, erect, adpressed, sessile, alternate, with pustulate gland-dots scattered mainly towards the midrib. *Inflorescence* terminal, 1- or 2-nate, sessile, 5 mm diam., yellow in bud, cream when open displaying the cup filled with nectar and the red-tipped staminodes on the lobes of the disc. *Bract* 1,1 mm long, 0,8 mm broad, deltoid, thick, obtuse, glabrous, appressed, with pustulate gland-dots, sparsely ciliolate below. *Bracteoles* two, 1 mm long, 0,7 mm broad, oblong, obtuse, thick, glabrous, margins narrow, ciliolate below, pustulate with gland-dots. *Calyx lobes* five, 1,2 mm long, 1,2 mm broad, ovate or sub-orbicular, thickened at the apex, glabrous, margins translucent, ciliolate, pustulate with gland-dots towards the midrib on the outside, pubescent inside. *Petals* five, 2,2 mm long, 1,5 mm broad, oblong, glabrous, sessile, cream coloured, spreading. *Staminodes* five, 0,2 mm long, 0,1 mm diam., apices reddened. *Filaments* five, becoming 1 mm long, glabrous, acicular. *Anthers* five, before anthesis 0,8 mm long, 0,7 mm broad, yellow, apical gland 0,2 mm diam. *Pollen* about 43 μ long, 25 μ diam., oblong. *Disc* 5-sinuate-crenulate, stands open, exceeds the ovary, green, exudes nectar. *Stigma* 0,3 mm diam., capitellate, 5-lobed at first becoming globose, green, sticky. *Style* becoming 0,8 mm long, glabrous, erect. *Ovary* 5-carpellate, 0,9 mm diam., glabrous, apex of each carpel with a large translucent gland. *Fruit* (from *Williams 1575*) 5-carpellate, 7 mm long, 6 mm diam., *carpels* reddened with *horns* green, short, spreading, rather thickened at the apex, sometimes recurved with the apical gland now on the under side. *Seed* (from *Williams 1575*) 6,3 mm long, 2,5 mm broad, black, shining.

SPECIMENS EXAMINED

CAPE—3320 (Montagu): Touwsberg, S. slopes of ridge (-DB), 3 000–4 000 ft., 1/6/1956 *Esterhuysen 25902* (BOL).

—— 3321 (Ladismith): Near Bosluis Pass, Swartberg, N. foothills, stony hilltop (-AD), 10/10/1960 *Esterhuysen 28254* (BOL); Dry stony summit of the Paardeberg at the head of Huis River Pass (-BC), 23/5/1950 *Esterhuysen 17113* (BOL, LD); Gamka Pass near Calitzdorp, sandstone summit and slopes, 24/5/1950 *Esterhuysen 17134* (BOL, NBG); In plains at the summit of the road between Garcias Pass and Muiskraal (-CC), –/10/1904 *H. Bolus 11240* (BOL); Garcias Pass, 9/8/1949 *Morris 241* (BOL, NBG); N. side of Garcias Pass, 1 700 ft., 8/12/1938 *Wall s.n.* (LD); on hill above Muiskraal, Garcias Pass, 1 900 ft., 23/12/1971 *Williams 1614* (NBG); Waterval, 15 m. E. of Garcias Pass on N. slopes of Langeberg (-CD), 1 800 ft., 1/10/1923 *Muir 2913* (BOL, GRA); Roodeberg (-DA), 4 500 ft., 1/11/1931 *Compton 3846* (BOL, NBG), 5 000 ft., 1/11/1941 *Compton 3922* (BOL, NBG), 4 000 ft., –/3–1940 *Lewis 1754* (SAM), 24/3/1940 *Compton 8661* (NBG); Roodeberg Pass near summit c. 3 000 ft., 19/7/1954 *Stokoe s.n.* (SAM); Rooiberg Pass, N. side and S. side 2 000 –2 500ft., 30/10/1971 *Williams 1575* (NBG); N. side of Rooiberg Pass, 1 850 ft. (570 m), 12/7/1974 *Williams 1905* (NBG, BOL, C, K, M, MO, PRE, S, STE).

—— 3322 (Oudtshoorn): Slopes above Meirings Poort, S. aspect (-BC), 16/10/1955 *Esterhuysen 24843* (BOL); N. foot of Outeniquas near Moeras River (-CC), 2/12/1951 *Esterhuysen 19442* (BOL, NBG); Klein Moeras Rivier Spruiten, 6/12/1951 *Barker 7718* (BOL, NBG); Kruis Pad, N. of Moeras Rivier, 24/11/1949 *Compton 21760* (NBG); Langkloof hills, N. of Eensaamheid, on road to Buffelsdrif (-DD), 2 550 ft., 14/8/1971 *Williams 1508* (NBG).

—— 3323 (Willowmore): Top of pass between Avontuur and Uniondale (-CA), 3 500 ft., –/3/1922 *Fourcade 2904* (BOL, GRA); Hoopsberg summit (-CB), 6 200 ft., 6/11/1941 *Esterhuysen 6541* (BOL); 4 miles N. of Ongelee P.O., 2 400 ft., 16/11/1958 *Acocks 20000* (BOL); Ongelegen, 31/1/1941 *Esterhuysen 4695* (BOL, GRA); Kouga Mts., peak E. of Smutsberg, lower shaly slopes (-DB), 27/11/1941 *Esterhuysen 7027* (BOL); Kouga Mts., lower slopes near Smutsberg, E. aspect, 12/11/1944 *Esterhuysen 10728* (BOL); Kouga, 29/11/1941 *Esterhuysen 4688* (BOL, GRA, SAM), 20/12/1933 *Compton 4586*

(BOL, NBG), 29/1/1941 *Compton 10522* (NBG); near Joubertina (-DD), 2/5/1935 *Compton 5208* (BOL, NBG), 23/7/1942 *C. J. Esterhuysen s.n.* (BOL, NBG).

—— 3424 (Steytlerville): Baviaanskloof, hillside above kloof (-CB), 21/10/1955 *Esterhuysen 24992* (BOL), 21/10/1955 *Esterhuysen 25004* (BOL); Cambria, Humansdorp Division, 13/4/1952 *Compton 23471* (NBG), 13/4/1952 *Compton 23484* (NBG); Cambria Pass, Humansdorp Division, 26/4/1953 *Compton 24083* (NBG); Plateau 10 miles W. of Cambria, 2 000 ft., 29/4/1947 *Story 2451* (GRA); Kouga hills, Sewefontein, Humansdorp Division (-CC), 12/11/1941 *Esterhuysen 6700* (BOL); Guerna Kop, S. slopes above drift on Koega River (-CD), 700 ft., 2/5/1972 *Rourke 1323* (NBG, STE); Cockscomb, Winterhoek Mts., rocky kloof and ridge on N. slopes (-DB), 2 000–3 000 ft., 2/2/1958 *Esterhuysen 27488* (BOL), 30/11/1958 *Esterhuysen 27988* (BOL).

Distribution, Biology and Variation

Diosma prama has so far been found distributed over a wide area from the Touwsberg in the west to the Cockscomb Mountain in the east, a distance of about 350 km (220 miles) and at altitudes varying from 210 m (700 ft.) at Guerna Kop up to 1 700 m (5 600 ft.) on the summit of the Hoopsberg. It is found in mountainous country growing on hard dry stony or rocky ground derived from the Table Mountain series. It has been collected in every month of the year except September and would therefore appear to have a very extended flowering period. However, a few fruits may be seen from July onwards reaching a peak about the end of October so that perhaps the peak of the flowering season may occur in June or July. The wide open flower, with its cup of nectar and its pollen ripening before the style lengthens would indicate that this plant is most probably insect pollinated. In fact, when collecting the type material in July, bees (*Apis mellifera*) were observed to be visiting the flowers. As the plant, quite plainly, does not coppice from the root, regeneration is possible only from seed which is dispersed when ripe in the usual manner by a catapult mechanism.

The leaves when crushed have a rather faint resinous smell. They have a light green colour making the plant quite conspicuous amongst the other vegetation. One stem 18 mm in diam., showed about 25 rings. The largest plant seen had a stem about 30 mm in diam., so that the veld in this part of Rooiberg Pass had clearly not been burnt for perhaps 50 years.

With such a large area of distribution one might expect to find some variation in this species. This becomes apparent towards the eastern limit of the range where populations are found to have somewhat larger leaves that are also slightly more spreading, more or less forming a cline. This difference may be entirely due to a change in the rainfall pattern, the smaller adpressed leaves indicating dryer conditions in the west and the slightly spreading leaves the more humid conditions in the east.

DISCUSSION

The wide open flower enables one to see at once that this plant should be placed in the genus *Diosma* L. Other criteria which exclude other genera of the *Diosmeae* are:

(1) *Petals* clawless, sessile, patent. (2) *Staminodes* minute. (3) *Anther* with a small spherical apical gland. (4) *Disc* 5 sinuate crenulate, stands open, exceeds the ovary. (5) *Stigma* capitellate. (6) *Style* short. (7) *Filament* and *style* glabrous. (8) *Ovary* 5-carpellate.

Diosma prama is recognised as a distinct species because of its having branchlets virtually glabrous, leaves with pustulate gland-dots scattered mainly towards the midrib, calyx lobes pustulate with gland-dots but without any apical callus, petals glabrous, style erect and staminodes 0,2 mm long. It differs from

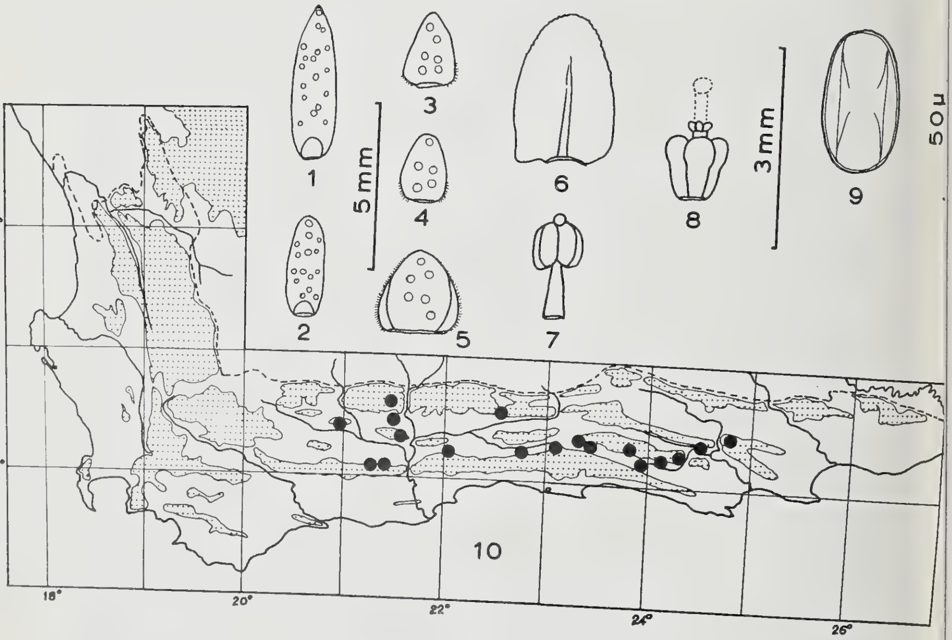

FIG. 5.

Diosma prama: 1, leaf. 2, leaf. 3, bract. 4, bracteole. 5, calyx lobe. 6, petal. 7, anther. 8, gynoecium. 9, pollen. 10, distribution.

D. ramosissima Bartl. & Wendl. which has a closely spaced row of gland-dots on either side of the midrib of the leaf, branches, leaves and petals puberulous and no staminodes. It differs also from *D. passerinoides* Steud. which has branchlets puberulous, leaves with one or two gland-dots on the margins as well as on the midrib, calyx lobes without gland-dots but with an apical callus and staminodes vestigial. The epithet *prama* is a telescoping of the rather unwieldy name *p*seudo*ra*mosissi*ma* indicating the confusion that formerly existed in identifying these species.

Diosma awilana Williams sp. nov. propria propter folia late lanceolata reflexo-mucronata crispo-ciliata alterna sessilia, staminodia carens, ovarium glabrum.

Frutex ad 1–2 m, erectus, ad basim monocaulis. *Cortex* satis levigata. *Rami* erecti, glabrescenti. *Ramuli* erecti, breviores, pubescenti, foliosi. *Folia* 5 mm longa, 3,3 mm lata, ovata vel late lanceolata, acuta, reflexo-mucronata, crispo-ciliata, glabra, sessilia, alterna, erecta, sub-complicata, glanduloso-punctata. *Inflorescentia* terminalia, 1–4 aggregata. *Bractea* 3,5 mm longa, 1,7 mm lata, lanceolata, acuta, mucronata, crispo-ciliata, glabra, glanduloso-punctata. *Bracteolae* duae, 2 mm longae, 0,7 mm latae, lanceolatae, acutae, mucronatae, ciliatae, glabrae. *Sepala* quinque, 2,3 mm longa, 1,8 mm lata, late-lanceolata, acuta, mucronata, glabra, marginibus hyalinis ciliatis. *Petala* quinque, 2,9 mm longa, 2 mm lata, orbicularia, glabra, sessilia, minute apiculata, sparsim ciliolata. *Staminodia* carens. *Filamenta* glabra, acicularia, post anthesin 2 mm longa. *Anthereae* quinque, ante anthesin 0,8 mm longae, 0,7 mm latae, aurantiaca, apicibus minute glandulosis. *Pollen* 60 μ longum, 28 μ diam., ellipsoideum. *Discus* 5-sinuato-crenulatus, patens, 2 mm diam., ovarium excedens, nectarifer. *Stigma* 0,2 mm diam., capitellatum, viridum. *Stylus* glaber, primo deflexus, deinde erectus, 2 mm longus. *Ovarium* 5-carpellatum, 0,7 mm diam., glabrum. *Fructus* 5-carpellatus, 12 mm longus, glaber, multi-glanduloso-punctata, oleosus, cornibus 5 mm longis erectis. *Semen* 5,3 mm longum, 2,8 mm latum, piceum, nitens.

Type: CAPE—3419 (Caledon): at base of limestone hills, Awila south of Baardscheerdersbosch, Bredasdorp Division (-DA), 61 m (200 ft.), 25/5/1973 *Williams 1803* (NBG, holotype; PRE, STE, MO, K, isotypes).

Diosma awilana appears to have been first collected by Compton in 1946 and then by Barker and Lewis in January 1948 and then again by Lewis and Martin in June 1950. These localities were given different names but there is little doubt that they all refer to the same locality on, and near, the farm Awila where this species is still to be found.

Shrubs up to 1,2 m tall, erect, arising from a single stem at base. *Branches* erect, glabrescent, arising in clusters, with a fairly smooth bark. *Branchlets* erect, fairly short, pubescent, well clothed with leaves. *Leaves* up to 8 mm long, 4,7 mm broad, normally about 5 mm long, 3,3 mm broad, ovate or broadly-lanceolate, acute, apex abruptly recurved with a sharp point, hyaline margins narrow, crisped ciliate, glabrous, sessile, alternate, erect, sub-complicate, gland-dotted along the blade on either side of the midrib. *Inflorescence* terminal, 1–4 aggregate, flowers opening in succession. *Bract* 3,5 mm long, 1,7 mm broad, leaf-like, lanceolate, acute, mucronate, crisped ciliate, glabrous, gland-dotted on either side of the midrib. *Bracteoles* two, 3 mm long, 0,7 mm broad, lanceolate, asymmetrical in outline, acute, mucronate, ciliate, glabrous. *Calyx lobes* five, 2,3 mm long, 1,8 mm broad, broadly lanceolate, acute, mucronate, apex pink in colour, glabrous, ciliate with broad translucent margins. *Petals* five, 2,9 mm long, 2 mm broad, orbicular, glabrous, minutely apiculate, sessile, sparsely ciliolate. *Staminodes* absent. *Filaments* five, glabrous acicular, becoming 2 mm long. *Anthers* five, before anthesis 0,8 mm long, 0,7 mm broad, yellow tinged with pale red, apical gland minute and sessile. *Pollen* 60 μ long, 28 μ diam., ellipsoidal, slightly contracted in the middle. *Disc* 5-sinuate-crenulate, spreading, 2 mm diam., green, exudes nectar, exceeds the ovary by a long way. *Stigma* 0,2 mm diam., capitellate, green. *Style* glabrous, at first deflexed finally becoming erect and nearly 2 mm long. *Ovary* 5-carpellate, 0,7 mm diam., glabrous. *Fruit* 5-carpellate, 12 mm long, glabrous, oily when fresh with many gland-dots, with horns 5 mm long, erect. *Seed* 5,3 mm long, 2,8 mm broad, black, shining.

SPECIMENS EXAMINED

CAPE—3419 (Caledon): limestone hills near Gansbaai (-DA), –/1/1948 *Lewis 3093* (SAM); Baardscheedersbos, Bredasdorp Division, 25/1/1948 *Barker 5306* (NBG); Hagelkraal, near Danger Point on limestone hills, –/6/1950 *Lewis 3369* (SAM); Havenga's farm near Strandskloof, Bredasdorp Division, 12/6/1950 *Martin 352* (BOL, NBG); at base of limestone hills, Awila south of Baardscheerdersbos, Bredasdorp Division, 61 m (200 ft.), 29/8/1971 *Williams 1514* (NBG), 25/5/1973 *Williams 1803* (NBG, PRE, STE, MO, K); Witkoppies near Dassieshoek on road to Awila, Bredasdorp Division (-CB), 150 ft., 2/8/1973 *Williams 1835* (NBG), Hagelkraal, limestone hills, Bredasdorp Division, 28/12/1946 *Compton 19037* (NBG).

DISTRIBUTION, BIOLOGY AND VARIATION

Diosma awilana appears to be confined to a fairly small area along the southern base of the range of limestone hills to the south of Baardscheedersbos village. The plants grow at an altitude of 45 to 61 m (150–200 ft.) above sea level in deep sandy soil with very little humus. Flowering material has been collected in January and May and fruiting material in August. The presence of nectar in the wide open flower would indicate that this plant is insect pollinated. When ripe the seed is ejected by the usual catapult mechanism and regeneration takes place only after fires which clear the ground of its cover of vegetation. The leaves when crushed are not very strong smelling. No variation has been noted in this relatively rare species.

The following characters indicate firstly that this species should be placed in the genus *Diosma* and furthermore help to exclude it from other genera of the *Diosmeae*: (1) The *flower* stands wide open with the *petals* sessile; (2) *staminodes* absent; (3) *anther* with a minute apical gland; (4) *disc* 5-sinuate-crenulate, exceeds the ovary, spreads open; (5) *stigma* capitellate; (6) *style* short; (7) *style* and *filaments* glabrous; (8) *ovary* 5-carpellate.

Diosma awilana is recognised as distinct on account of its having alternate leaves, sessile, broadly lanceolate with the mucro sharply reflexed and margins crisped ciliate; without any staminodes and with the ovary glabrous. It is probably most closely related to *Diosma subulata* which occurs both to the west near Walker Bay and to the east along the base of the Soetanysberg and at

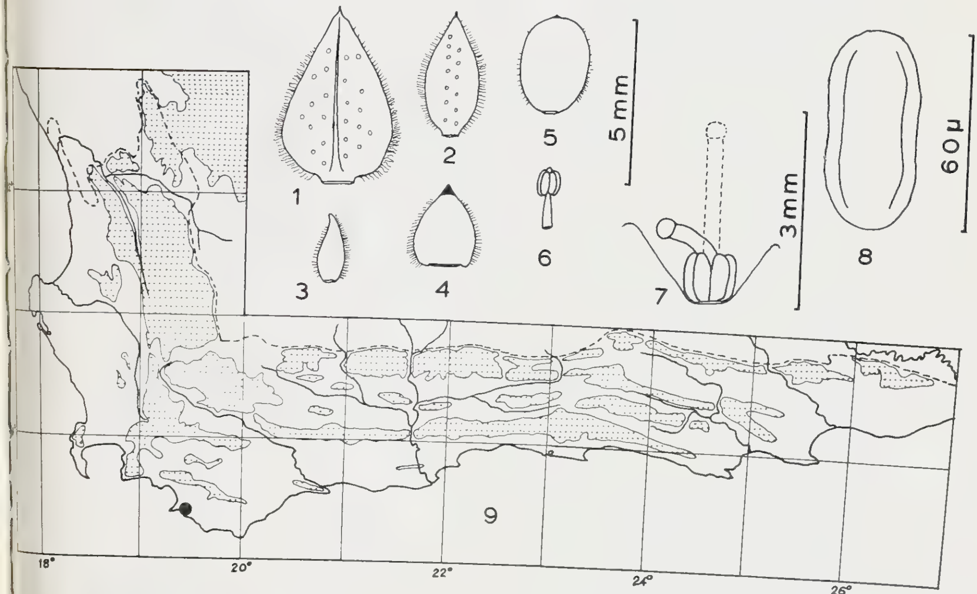

FIG. 6.

Diosma awilana: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium. 8, pollen. 9, distribution.

Cape Agulhas. *D. subulata* however has leaves that are frequently opposite, petiolate and falcate with a straight point. It also differs from *Diosma sabulosa*, which occurs much further to the east from the Potberg to Albertinia, which has smaller leaves with less hairy margins, with a smaller point at the apex and with smaller flowers. The name refers to the farm where the type material was collected.

Diosma sabulosa Williams sp. nov. ad basim monocaulis, propria propter planta erecta, folia ovata alterna, ad costa glanduloso-punctata dispersa, marginibus anguste hyalinis, staminodia carens, petula ovariaque glabra.

Frutex c. 1 m, erecta, ad basim monocaulis. *Rami* erecti, graciles, glabrescentes, alterni. *Ramuli* erecti, brevi, graciles, albo-puberuli, foliosi. *Folia* 3–4 mm longa, 2,5–3 mm lata, 5-faria, alterna, patentia, glabra, sessilia, ovata, acuta, mucronulata, marginibus anguste hyalinis serrulatis vel setulosis, intus plana, extus ad costa glanduloso-punctata. *Inflorescentia* terminalia, reductissimo-racemosa; flores pauci, conferti, sessiles. *Bractea* 2,5–2,8 mm longa, 0,8–1,4 mm lata, glabra, sessiles, lanceolata vel anguste ovata, acuta, mucronulata, marginibus ciliolata anguste hyalinis. *Bracteolae* duae, 1,4 mm longae, 0,6 mm latae, deltoideae, acutae, glabrae, carinatae, sub-ciliolatae, 1–2 glanduloso-punctatae. *Sepala* quinque, 1,6 mm longa, 1,2 mm lata, ovata, acuta, glabra, patentia, mucronulata, marginibus ciliolatis hyalinis, costa 1–2 glanduloso-punctata ad apice carinata. *Petala* quinque, 2,5 mm longa, 1,7 mm lata, obovata, sessiles, patentes, alba, ad lateribus sub-ciliolata. *Staminodia* carentia. *Filia* quinque, post anthesin 1,5 mm longa, glabra, aciculares, patentes. *Antherae* quinque, ante anthesin 1 mm longae, 0,7 mm latae, flavescentes, apicibus minute subimmerso-glandulosis. *Pollen* 56 μ longum, 26 μ diam., oblongum. *Discus* 5-sinuatus, parum 5-crenulatus, viridus, succulentus, patens, nectarifer, ovarium magnopere excedens. *Stigma* 0,25 mm diam., globosum, viridum, capitellatum. *Stylus* prima deflexus, deinde erectus, 1 mm longus, glaber, teres. *Ovarium* 5-carpellatum, 0,7 mm diam., *carpella* glabra, apicibus hemisphaericis. *Fructus* 5-carpellatus, 9 mm longus, 8 mm diam., glaber, glanduloso-punctatus, cornibus 2,5 mm longis, patentibus. *Semen* 6–6,5 mm longum, 2,7 mm latum, piceum, nitens.

Type: CAPE—3420 (Bredasdorp): Potberg, in deep sand at base of limestone hills between Buffelsfontein and Cupidoskraal (-BC), 137 m, Bredasdorp Division, 22/1/1975 *Williams 1955* (NBG, holotype; K, M, MO, PRE, S, STE, isotypes).

This plant was first collected by Galpin in 1897 at Melkhoutfontein and then again later by Dr. J. Muir in April 1909. Muir thought it to be conspecific with another hereinafter described for the first time as *Diosma echinulata*. He actually gave his specimen of *D. sabulosa* the collecting number 410 in April and a few months later, in September, when he collected *D. echinulata* he put "=410" on his ticket. Barker (5541) also made a mixed gathering of these two species more or less from the same locality as Muir.

Shrubs about 1 m tall, erect, arising from a single stem at base. *Branches* erect, fairly slender, glabrescent, alternate; bark rough with leaf scars. *Branchlets* erect, short, slender, white-puberulous, leafy. *Leaves* 3–4 mm long, 2,5–3 mm broad, 5-ranked, alternate, spreading, glabrous, sessile, ovate, acute, mucronulate, margins narrowly cartilaginous irregularly serrulate above and setulose below, adaxial surface flat, abaxial surface with gland-dots scattered mainly towards the prominent midrib. *Inflorescence* terminal, a very much reduced raceme; flowers few, crowded, sessile, puberulous below. *Bract* 2,5–2,8 mm long, 0,8–1,4 mm broad, glabrous, sessile, lanceolate or narrowly ovate, acute, mucronulate, margins narrowly cartilagenous, ciliolate. *Bracteoles* two, 1,4 mm long, 0,6 mm broad, narrowly deltoid, acute, glabrous, keeled, sub-ciliolate, with 1 or 2 gland-dots. *Calyx lobes* five, 1,6 mm long, 1,2 mm broad, ovate, acute, glabrous, spreading, mucronulate, margins translucent, ciliolate, with 1 or 2 gland-dots. *Petals* five, 2,5 mm long, 1,7 mm broad, obovate, sessile, spreading, white, sub-ciliolate at the sides. *Staminodes* completely absent. *Filaments* five, becoming 1,5 mm long, glabrous, acicular, spreading. *Anthers* five, before anthesis 1 mm long, 0,7 mm broad, yellowish with a semi-immersed apical gland, becoming reflexed after anthesis. *Pollen* 56 μ long, 26 μ broad, oblong. *Disc* 5-sinuate, slightly 5-crenulate, green, fleshy, stands open, exudes nectar, exceeds the ovary by a long way. *Stigma* 0,25 mm diam., globose, green, capitellate. *Style* glabrous, terete, at first deflexed becoming 1 mm long, erect. *Ovary* 5-carpellate, 0,7 mm diam.; *carpels* glabrous, apices hemispherical. *Fruit* (from *Williams 1873*) 5-carpellate, 9 mm long, 8 mm diam., gland-dotted, glabrous, striate veined when dry; *horns* 2,5 mm long, spreading, apical gland immersed. *Seed* 6–6,5 mm long, 2,7 mm broad, black, shining.

SPECIMENS EXAMINED

CAPE—3420 (Bredasdorp): Potberg, in deep sand at base of limestone hills between Buffelsfontein and Cupidoskraal (-BC), 137 m (450 ft.), Bredasdorp Division, 22/1/1975 *Williams 1955* (NBG, K, M, MO, PRE, S, STE), 21/11/1973 *Williams 1873* (NBG); Limestone hills near Potberg, on rocky plateau, 19/9/1954 *Esterhuysen 23306* (BOL, NBG).

— 3421 (Riversdale): near Askop, south side of main road 10 miles west of Albertinia (-AB), 600 ft., 2/3/1974 *Williams 1881* (NBG); Steenkoolfontein, near Puntjie (-AC), 25/1/1961 *Esterhuysen 28770* (BOL; Trompskop, between Riversdale and coast 25/1/1961 *Esterhuysen 28774a* (BOL); Still Bay hills (-AD), 9/8/1949 *Barker 5541* (*ex parte*) (NBG), 9/8/1949 *Morris 266* (BOL, NBG); near Still Bay, –/4/1909 *Muir 410* (BOL, GRA); Milkwoodfontein, 7/10/1897 *Galpin 3849* (BOL, GRA); National Road near Albertinia (-BA), 7/12/1951

Esterhuysen 19516 (BOL, NBG); between Albertinia and Riversdale, 7/12/1951 *Compton 23175* (BOL, NBG); near Albertinia, 900 ft., 28/10/1971 *Williams 1566* (NBG, STE); Buffelshoek near sea, rocky places (-BC/BD), *Muir 1108* (BOL).

DISTRIBUTION, BIOLOGY AND VARIATION

Diosma sabulosa is found growing in dry sandy soil at altitudes of from nearly sea level at Buffelshoek to about 275 metres above sea level at Albertinia. The westernmost populations occur near the Potberg and Albertinia seems to be the eastern limit of distribution, a distance of about 96 kilometres away. A plant from the type locality about 1 m tall showed 12 annual rings. It would very much appear, from the collections made, that this plant blooms nearly the whole year round but fruits are only to be seen in the latter half of the year from August to December. The reason for this is by no means obvious. It is possible that in the dry part of the year the flowers abort due to drought or to the absence of pollinating agents. The wide open flower with its, at first, deflexed style and the presence of nectar indicate that this species is most probably insect pollinated. The seeds are powerfully ejected when ripe in the hot dry weather by the usual catapult mechanism and, being an erect single stemmed plant that is destroyed by fire, regeneration can only take place from seed.

Variation in this taxon is most obvious in the size of the fruit. Populations at the easternmost limit of distribution have larger fruits with strongly recurved horns.

What is undoubtedly a most closely related species, *Diosma subulata* Wendl., occurs in similar sandy soil behind the dunes and near the sea to the west in the Walker Bay area. Another species, *D. awilana* herein described for the first time, occurs also in sandy soil near Baardscheedersbosch and is also closely related. These three species, which may once have formed part of a cline, are similar in that they possess no staminodes whatever and have glabrous petals. Their rather thin edged leaves show a change from subulate-lanceolate in *D. subulata*, to ovate-lanceolate in *D. awilana*, to ovate in *D. sabulosa*. It is interesting to note that a parallel series of three *Diosma* species occurs on the limestone nearby but these plants all bear small staminodes, and their rather thick edged leaves have apices that change from obtuse in *D. demissa* to a blunt point in *D. guthriei* to a sharp point in *D. echinulata*.

DISCUSSION

This plant is placed in the genus *Diosma* L. because it possesses the following characters one or other of which serve to exclude it from any other genus in the *Diosmeae*: (1) *petals* sessile, clawless; (2) *staminodes* absent; (3) *anther* bears a minute apical gland; (4) *disc* sinuate-crenulate, open, exceeds the ovary by a long way; (5) *stigma* capitellate; (6) *style* short; (7) *filaments* and *style* glabrous; (8) *ovary* 5-carpellate.

Diosma sabulosa is recognised as distinct on account of its being a tall plant arising from a single stem, with leaves ovate, alternate, sessile, gland-dotted towards the midrib with thin translucent margins, without staminodes and with petals and ovary glabrous. It differs from *D. echinulata*, from the neighbouring limestone, which is a small scabrous plant with leaves closely spaced, setose-pubescent with a sharp mucro, thick margins and a short petiole, with petals pubescent and ovary crowned with short setose hairs.

The name refers to the sandy habitat where this plant is found.

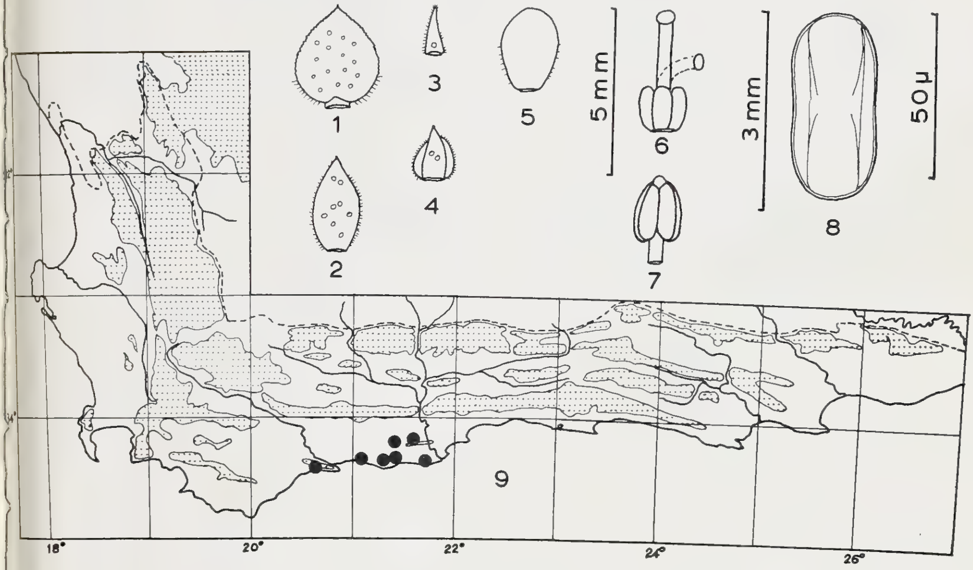

FIG. 7.

Diosma sabulosa: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, gynoecium. 7, anther. 8, pollen. 9, distribution.

Diosma demissa Williams sp. nov. propria propter ramulos dispersos, folia lanceolata obtusa petiolata alterna, cornua brevia.

Frutex ad 25 cm, demissus, effusus, ad basim monocaulis. *Ramuli* brevi, puberuli, numerosi, dispersi. *Folia* ad 5,5 mm longa, 2 mm lata, lanceolata, obtusa, glabra, eciliata, breve petiolata, erecta, conferta, alterna, costis glanduloso-punctatis. *Inflorescentia* terminalia, 1–3 nata, 7 mm diam., alba, sessiles.

Bractea 1,8 mm longa, 1,2 mm lata, sub-ovata, glabra, crassa, marginibus minute serrulatis ad basim ciliolatis. *Bracteolae* duae, 1,5 mm longae, 1,2 mm latae, ovatae, glabrae, sparsim ciliolatae. *Sepala* quinque, 2 mm longa, 1,5 mm lata, ovata, obtusa, glabra, apicibus incrassatis, marginibus hyalinis, ciliolatis. *Petala* quinque, 3 mm longa, 2,2 mm lata, ovata, alba, glabra, sessilia. *Staminodia* quinque, 0,17 mm diam., sphaerica. *Filamenta* quinque, glabra, post anthesin 2 mm longa. *Antherae* quinque, ante anthesin 1,1 mm longae, 0,8 mm latae, aurantiacae, apicibus 0,2 mm diam., glandulosis. *Pollen* 50 μ longum, 25 μ diam., ellipsoideum. *Discus* 5-sinuato-crenulatus, ovarium excedens, patens, nectarifer. *Stigma* 0,3 mm diam., capitellatum, viridum. *Stylus* glaber, 1,5 mm longus. *Ovarium* 5-carpellatum, 0,7 mm diam., glabrum, rubescens. *Fructus* 5-carpellatus, 6,5 mm longus, glaber, cornibus 1,5 mm longis, patentibus. *Semen* 3,8 mm longum, 2,2 mm latum, piceum, nitens.

Type: CAPE—3419 (Caledon): between Stanfords Cove and Die Kelders, near the sea (-CB), 15 m (50 ft.), Caledon Division, 20/7/1974 *Williams 1909* (NBG, holotype; K, M, MO, PRE, S, STE, isotypes).

Diosma demissa was first collected and drawn by Miss M. Walgate (now Mrs. McNae) in December 1940 at Danger Point near the lighthouse. It was subsequently gathered on only about half a dozen occasions but remained unnoticed in various herbaria until the author made the first of several collections in 1972.

Shrubs up to 25 cm tall, pressed down by the wind, spreading about 1 m, arising from a single stem at base. *Branches* variously bent, decumbent, fairly smooth with faint leaf scars. *Branchlets* short, puberulous, pale green, well clothed with leaves, somewhat erect, numerous, scattered, often in clusters. *Leaves* up to 5,5 mm long, 2 mm broad, lanceolate, obtuse, hyaline, margins narrow, rather thick, somewhat serrulate, a single row of gland-dots on the midrib, erect, crowded, 5-ranked, *petiole* 0,4 mm long. *Inflorescence* terminal, 1–3 nate, 7 mm diam., white, sessile. *Bract* 1,8 mm long, 1,2 mm broad, subovate, glabrous, thick, midrib with one gland-dot, margins minutely serrulate, ciliolate below. *Bracteoles* two, 1,5 mm long, 1,2 mm broad, ovate, glabrous, apex thickened, margins translucent, sparsely ciliolate. *Calyx lobes* five, 2 mm long, 1,5 mm broad, ovate, obtuse, glabrous, apex spreading and thickened, hyaline margins broad, ciliolate. *Petals* five, 3 mm long, 2,2 mm broad, ovate, white, glabrous, patent, sessile, connate with the disc. *Staminodes* five, 0,17 mm diam., spherical, vestigial. *Filaments* five, becoming 2 mm long, acicular, glabrous. *Anthers* five, before anthesis 1,1 mm long, 0,8 mm broad, orange coloured, apical gland 0,2 mm diam., spherical. *Pollen* 50 μ long, 25 μ diam., ellipsoid. *Disc* 5-sinuate-crenulate, exceeding the ovary by 1 mm, spreading above, exudes nectar. *Stigma* 0,3 mm diam., capitellate, green. *Style* glabrous, at first deflexed, becoming erect, 1,5 mm long. *Ovary* 5-carpellate, 0,7 mm diam.,

glabrous, reddened above. *Fruit* 5-carpellate, 6,5 mm long, glabrous, somewhat reddened below, *horns* 2 mm long, spreading, apices depressed. *Seed* 3,8 mm long, 2,2 mm broad, black, shining.

SPECIMENS EXAMINED

CAPE—3419 (Caledon): Die Kelders, car park near Die Plaat, Caledon Division (-CB), 100 ft., 28/3/1972 *Williams 1634* (NBG, STE), 10/6/1973 *Williams 1818* (NBG), 9/11/1962 *Taylor 4279* (STE); between Stanfords Cove and Die Kelders, near the sea, 50 ft., 20/7/1974 *Williams 1909* (NBG, K, M, MO, PRE, S, STE); Romansbaai, Danger Point, Caledon Division, 100 ft., 27/2/1973 *Williams 1771* (NBG); north side of peninsula near Danger Point, 21/1/1946 *Leighton 1554* (BOL); Danger Point, near lighthouse 60 ft., 27/2/1973 *Williams 1770* (NBG), 10/6/1950 *Maguire 12* (NBG), –/6/1950 *Lewis 3368* (SAM), 29/12/1940 *Walgate 85* (BOL), 30/12/1940 *Compton 10219* (NBG); Franskraal, 25/12/1946 *Leighton 2507* (BOL); Hagelkraal (-DA), 25/12/1946 *Compton 18979* (NBG).

DISTRIBUTION, BIOLOGY AND VARIATION

Diosma demissa although quite abundant, is found only in a relatively small area close to the sea in Walker Bay from Die Kelders in the north to Danger Point in the south, a distance of about 11 km, and along the south coast as far as Hagelkraal, a distance of another 12 km. Beyond this point towards the east there seems to be no suitable habitat in which this plant can grow. It grows in small sandy pockets in the tertiary limestone which overlies the Table Mountain Sandstone along the coastal cliffs. This is one of the few plant species able to survive in this exposed habitat with its strong salt laden winds. The bushes spread quite widely but never grow much above 20 cm tall. The stems are tough and variously bent and the twigs are grazed by sheep. Flowering would seem to begin about March and to go on for several months. Ripe fruits can first be found towards the end of July. The plant is destroyed by fire which is fortunately a fairly rare occurrence in this area. Regeneration is from seed ejected, when ripe, in the usual way by a catapult mechanism. The presence of nectar, the, at first, deflexed style and the wide open flower indicate that this species is most probably pollinated by insects.

The leaves when crushed have a strong but sweet resinous smell by no means unpleasant. A section, 6,5 mm diam., from the stem of one plant (*Willams 1818*) showed 8 annual rings and another, 19 mm diam., showed about 25 rings.

There is no apparent variation in this species and up to now no very closely related species has been found nearby. Another species *Diosma guthriei* occupies a similar ecological niche on limestone near the sea. It is found to the east in the Bredasdorp Division.

DISCUSSION

In placing this plant in the genus *Diosma* L. one takes note of the following characters: (1) The *flower* stands wide open with the *petals* clawless, glabrous and sessile. (2) *Staminodes* vestigial. (3) *Anther* with a minute apical gland. (4) *Disc* 5-sinuate-crenulate, exceeds the ovary, spreads open. (5) *Stigma* capitellate. (6) *Style* short. (7) *Style* and *filaments* glabrous. (8) *Ovary* 5-carpellate.

Diosma demissa is recognised as distinct on account of its having alternate branchlets, leaves lanceolate, obtuse, petiolate, 5-ranked, with a single row of gland-dots on the midrib. It differs from *D. guthriei* Glover which has branchlets often dichotomous, leaves much larger, ovate, acute, sessile, opposite or alternate with two rows of gland-dots along the midrib. In *D. demissa* there are two rather characteristic distinct pale green areas one on either side of the midrib. The epithet *demissa* alludes to the modest habit of this plant.

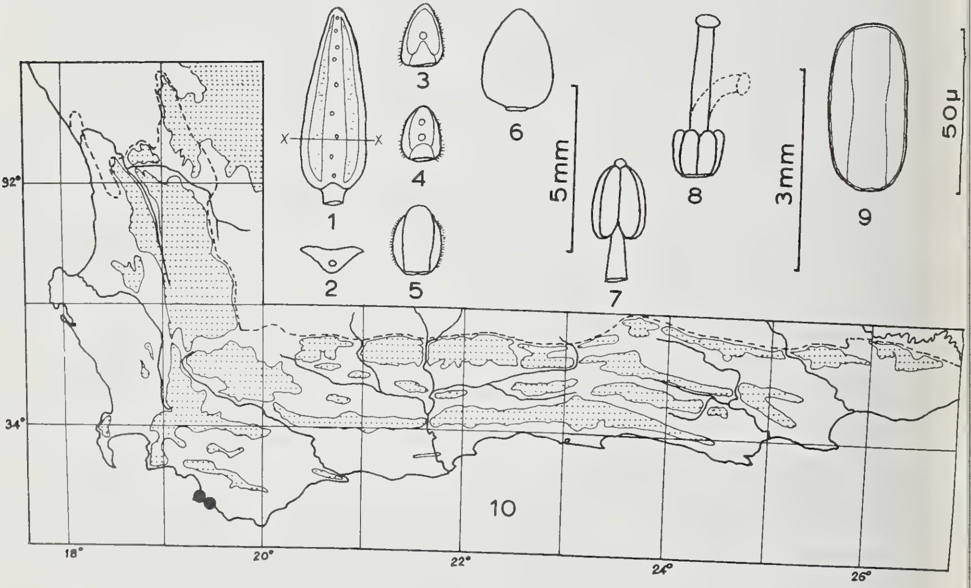

FIG. 8.

Diosma demissa: 1, large leaf. 2, cross section of leaf. 3, bract. 4, bracteole. 5, calyx lobe. 6, petal. 7, anther. 8, gynoecium. 9, pollen. 10, distribution.

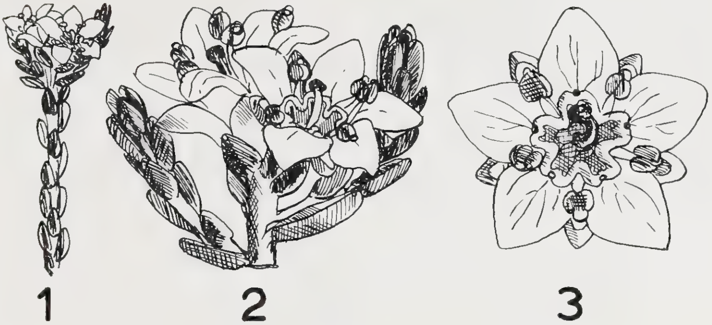

FIG. 9.

Diosma demissa: 1, flowering twig. 2, inflorescence × 3. 3, flower × 4. Drawn by M. Walgate who made the original gathering in December 1940.

Diosma echinulata Williams sp. nov. propria propter folia conferta setosa mucronata crassa petiolata, petala pubescentia, ovarium setulosum.

Frutex c. 40 cm, densus, rigidus. *Rami* brevi, tenices, foliosi. *Cortex* asper. *Ramuli* erecti, brevi, puberuli, sub-fasciculati. *Folia* 5–5,8 mm longa, petiolus 0,5 mm longus inclusus, 2–2,5 mm lata, lanceolato-elliptica, acuta, mucronata, tota sparsim setosa, imbricata, sub-erecta, alterna, 5-seriata, marginibus crassis scabridis, intus plana, extus manifeste nervosa indistincte glanduloso-punctata. *Inflorescentia* terminalia, aggregata; *flos* 5 mm diam., ad instar stellae, sessilis. *Bractea* 5 mm longa, 1–1,5 mm lata, lineara vel linear-oblanceolata, acuta, scabro-mucronata, tota setosa, ciliata, marginibus ad basim anguste hyalinis. *Bracteola* duae, 3–5 mm longa, 0,7–0,9 mm lata, bractea similis. *Sepala* quinque, 3,2–3,7 mm longa, 1,3–1,4 mm lata, anguste deltoidea, acuta, mucronata, tota setosa, ciliata, marginibus ad basim hyalinis. *Petala* quinque, 2,8 mm longa, 1,3 mm lata, oblonga, acuta, apiculata, sessilis, ciliata, intus in medio pauci-villosa, extus puberula. *Staminodia* quinque, c. 0,1 mm diam., vestigialia. *Filamenta* quinque, post anthesin 1,3 mm longa, glabra. *Antherae* quinque, ante anthesin 0,9 mm longae, 0,7 mm latae, luteae, apicibus minute glandulosis. *Pollen* 50 μ longum, 25 μ latum, ellipticum. *Discus* 5-sinuato-crenulatus, patens, viridus, nectarifer. *Stigma* 0,3 mm diam., capitellatum, viridum. *Stylus* 1,4 mm longus, teres, glaber. *Ovarium* 5-carpellatum, 0,7 mm diam., setulosum. *Fructus* 5-carpellatus, 6 mm longus, glaber, indistincte glanduloso-punctatus, cornibus c. 2 mm longus. *Semen* 4 mm longum, piceum nitens.

Type: CAPE—3421 (Riversdale): above Afvalskloof, Vermaaklikheid, Riversdale Division (-AC), 183 m (600 ft.), 21/1/1975 *Williams 1953* (NBG, holotype; K, M, MO, PRE, S, STE, isotypes).

Dr. J. Muir of Riversdale, who was the first person to collect this plant, thought it to be conspecific with *Diosma sabulosa*, another, then unnamed, species which he had collected a few months before and so put his number 410 on this label as well. Although both these plants have been subsequently collected on several occasions they have, up to now, remained undescribed.

Shrubs about 40 cm tall, dense, rigidly bushy and scabrous to the touch, with several branches arising from a stout root at ground level. *Branches* short, tough, with a rough grey-brown bark, remaining clothed with leaves for several years. *Branchlets* erect, short, somewhat clustered, hidden by the leaves, puberulous, 5-angled. *Leaves* 5–5,8 mm long, including the petiole 0,5 mm long, 2–2,5 mm broad, lanceolate-elliptic, acute, mucronate, sparsely setose on all sides, imbricate, sub-erect, alternate, 5-ranked, margins thick and scabrous, adaxial surface flat, abaxial surface with a prominent midrib, gland-dots indistinct and few in number on midrib and margins. *Inflorescence* terminal, with flowers and new shoots clustered together; *flowers* 5 mm diam., star-like, opening in succession. *Bract* 5 mm long, 1–1,5 mm broad, linear or linear-oblanceolate, acute, scabrid-mucronate, setose on all sides, ciliate, somewhat reddened, margins below narrowly translucent. *Bracteoles* two, 3,5 mm long, 0,7–0,9 mm broad, similar to the bract. *Calyx lobes* five, 3,2–3,7 mm long, 1,3–1,4 mm broad, narrowly deltoid, acute, mucronate, reddened above, setose on all sides, ciliate, margins below translucent. *Petals* five, 2,8 mm long, 1,3 mm broad, oblong, acute, apiculate, sessile and somewhat connate with the lobe of the disc, crisped ciliate, rounded at the base, adaxial surface with a few crisped hairs in the middle, abaxial surface puberulous. *Staminodes* five, 0,1 mm diam., vestigial, spherical at the apex of the lobe of the disc. *Filaments* five, becoming 1,3 mm long after anthesis, glabrous, acicular. *Anthers* five, 0,9 mm long, 0,7 mm broad, yellow, with a minute globose apical gland. *Pollen* 50 μ long, 25 μ broad, elliptic. *Disc* 5-sinuate-crenulate, stands open, pale green with a dark green rim, exudes nectar, exceeds the ovary by a long way. *Stigma* 0,3 mm diam., capitellate, green. *Style* at some stage slightly deflexed, becoming erect 1,4 mm long, terete, glabrous. *Ovary* 5-carpellate, 0,7 mm diam., carpels with apices setulose. *Fruit* (from *Williams 1589*) 5-carpellate, 6 mm long, glabrous, indistinctly gland-dotted, with horns about 2 mm long, fairly erect. *Seed* (from *Williams 1589*) 4 mm long, black, shining,

Specimens Examined

CAPE—3420 (Bredasdorp): hills above De Hoop, Bredasdorp Division (-AD), 600 ft., 15/4/1972 *Williams 1648* (NBG); north side of hills on road from De Hoop to Wydgelegen, Bredasdorp Division, 350 ft., 9/4/1974 *Williams 1885* (NBG); Elandspad, Potberg, towards the coast at Stillegat (-BC), 100 ft., 12/4/1972 *Williams 1639* (NBG); Elandspad, Potberg, on road to Noetsie, 300

ft., 2/7/1972 *Williams 1669* (NBG, STE); near Cape Infanta, low stony hills and plateau above coast (-BD), 28/9/1959 *Esterhuysen 28315* (BOL); Voelklip/ Graslaagte, Heidelberg duineveld, 125 ft., 27/10/1972 *Williams 1713* (NBG).
— 3421 (Riversdale): above Afvalskloof, Vermaaklikheid, Riversdale Division (-AC), 183 m (600 ft.), 21/1/1975 *Williams 1953* (NBG, K, M, MO, PRE, S, STE); Puntjie, on sand and limestone near the coast, 24/1/1961 *Esterhuysen 28754* (BOL); near Arbiters Kop, Blombos road, limestone hills, 600 ft., 31/10/1971 *Williams 1589* (NBG); hills opposite Still Bay (-AD), 600 ft., –/6/1909 *Muir 410* (*ex parte*) (BOL), -/9/1924 *Muir = 410* (GRA); Still Bay hills, 7/12/1951 *Compton 23182* (BOL, NBG), 9/8/1949 *Barker 5541* (NBG), 7/12/1951 *Esterhuysen 19529* (BOL); 10 miles west of Albertinia, limestone outcrop (-AB), 4/4/1952 *Lewis s.n.* (SAM *67220*), 4/4/1952 *Compton 23328* (NBG), 30/1/1951 *Compton 22581* (NBG, STE).

Distribution, Variation and Biology

The typical *Diosma echinulata* is found growing on limestone hills near the coast from the Duiwenhoks River in the west to just beyond the Kaffirkuils River in the east. Populations further to the west appear to have the leaves more widely spaced, becoming more sessile, the heads less crowded and the fruits and seeds somewhat larger. It is possible that populations will be found nearer to Bredasdorp that will grade into *Diosma guthriei*. The population 10 miles west of Albertinia which is much further inland has the ovary, petals and leaves glabrous. No closely related species appears to have been found further to the east but further to the west, in the Bredasdorp Division, one finds *Diosma guthriei* and still further westwards, near Gansbaai in the Caledon Division, one finds *Diosma demissa* both of which occur on a similar limestone habitat.

The wide open flower with its cup of nectar indicates that this plant is most probably pollinated by insects. Occasional regeneration after fires from the stout rootstock has been noted (*Williams 1669, Williams 1885*) and regeneration from seed also occurs in the usual way. The leaves when crushed have a faint smell of turpentine.

The Riversdale district, at the time when the type collection was made, was in the grip of a very serious drought and great difficulty was experienced in finding flowering material. From collections already made it would appear that, with the exception of periods of drought, flowers may be found throughout the year but ripe fruits are to be found only in the spring. At other seasons flowers must simply abort, indicating some connection with the absence of rain and, or, the possibility of the absence of the required pollinating agents.

The wide open flower has the typical appearance of a *Diosma*. Other characters which also exclude other genera of the *Diosmeae* are: (1) *flowers* terminal; (2) *petals* sessile, clawless, patent; (3) *staminodes* vestigial; (4) *anther* with a minute apical gland; (5) *disc* sinuate-crenulate, stands open, exceeds ovary; (6) *stigma* capitellate; (7) *style* short; (8) *filament* and *style* glabrous; (9) *ovary* 5-carpellate.

Diosma echinulata is recognised as distinct because of its having leaves alternate, closely spaced, setose, mucronate, thick, petiolate, petals pubescent on the outside with a few hairs on the inside at the throat, ovary with the apices of the carpels setulose. It differs from *D. guthriei* Glover which has leaves often opposite, glabrous, sessile, with a blunt point and petals and ovary glabrous. It differs also from *D. demissa* which is an entirely glabrous plant with obtuse leaves. The specific epithet is an allusion to the appearance of the ovary which resembles a minute hedgehog.

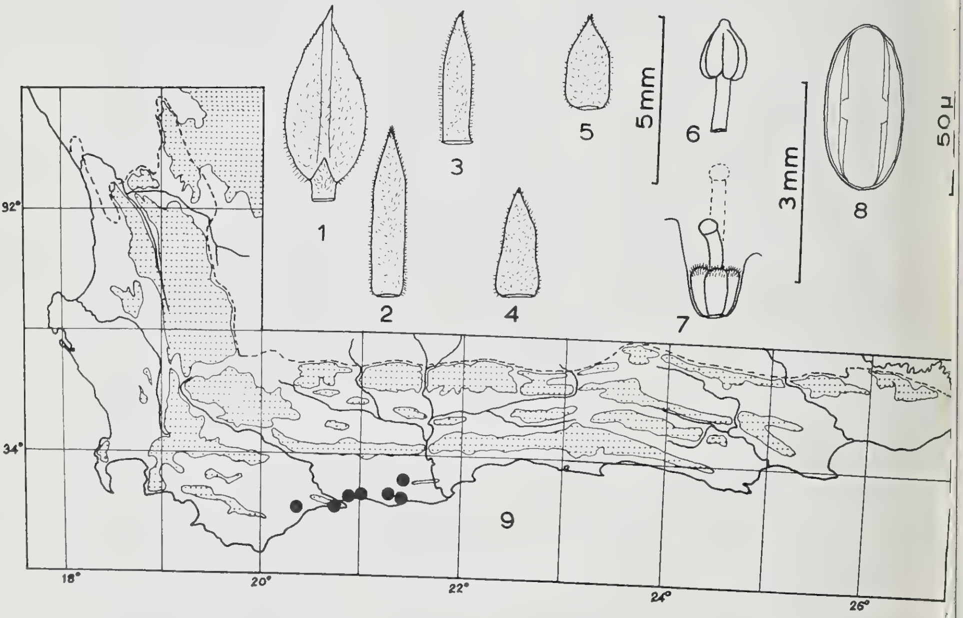

FIG. 10.
Diosma echinulata: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium. 8, pollen. 9, distribution.